

# **BM8/2**

## **Battery MEGGER Tester**



**MEGGER**®

# *Operating Instructions*

# SAFETY IN THE USE OF ELECTRICAL EQUIPMENT

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**It should be understood that any use of electricity inherently involves some degree of safety hazard.**

Various safety regulations and recommendations are in existence and new ones are being formulated, in an attempt to reduce the extent of such hazard. This is achieved principally by defining, as far as possible, the levels of voltage and current above which there is significant hazard; by establishing certain principles in the design of equipment and by recommending specific visual warnings of any residual hazard, to be placed on the equipment.

We, in common with other responsible manufacturers, take all reasonable steps to ensure that our products comply with relevant approved

safety standards. However, it must be emphasised that certain types of electrical testing essentially involve the use of voltages and currents above the limits defined as 'safe' values. For example, insulation testing and flash testing generally require the use of high voltages well above the safe limit and it may not always be possible to restrict the currents available from the test equipment to within the defined safe values.

It is recommended that the user of electrical equipment of any sort should always ensure that he understands, in detail, the equipment's characteristics so that he is aware of the degree of safety hazard which may be involved.

# SAFETY IN THE USE OF ELECTRICAL EQUIPMENT

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Whilst every effort is made by responsible manufacturers to reduce the hazards and to warn of any hazard remaining, it still rests with the user to play his part in ensuring his own safety.

The best way to achieve this is:—

- \* Understand the equipment you are proposing to use, and its ratings.
- \* Understand the application to which the equipment is to be put.
- \* Ensure that all reasonable safety procedures are followed.
- \* Take no chances, nor short cuts in safety procedures.

The equipment described in this handbook has been examined, both in design and manufacture, to ensure that safety hazards are minimised.

Any known remaining hazards are explained in the paragraph headed 'WARNING' on page 8

If for some specific application, it is found that the information provided is not adequate, then please contact the manufacturer for further details and assistance.

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## GENERAL DESCRIPTION

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The BM8/2 Battery Megger Tester is a battery operated multi-voltage d.c. insulation tester covering five values of insulation test voltage. The instrument is sufficiently light to enable it to be hand held, and is built into a durable plastic case.

Insulation readings are given directly in megohms, the scale plate carrying a single range calibrated 0-10 000 M $\Omega$  and infinity at 500V d.c. When measuring insulation resistance at other test voltages, the value of insulation may be obtained after applying the appropriate multiplying or dividing factor according to the voltage used.

Range selection is made by turning the centrally placed six position click-stop Range selector switch.

The switch positions and the insulation test voltages available are as follows:- 'B', 50V/DISCHARGE, 100V, 250V, 500V and 1000V d.c.

The test button in the centre of the Range selector switch energises the tester enabling the test voltage to appear at the instrument terminals.

Discharge of external circuit capacitance is obtained by releasing the Test button and turning the Range selector switch to the 50V/DISCHARGE position.

The battery condition may be checked at any time by turning the Range selector switch to 'B', pressing the test button and observing the pointer (see preliminary checks).

# APPLICATIONS

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The BM8/2 Battery MEGGER tester may be used for routine insulation resistance measurements on a variety of components such as motors, generators, transformers, high voltage insulators, power cables and wiring installations.

The tester may also be employed to make measurements designed to show the gradual decline that takes place in insulation when this is attacked by corrosion, dirt, grease, moisture, etc. during the operational life of a particular installation. Such monitoring enables the Maintenance Engineer to anticipate future performance and to plan ahead.

The tester will also show the improvement in insulation within motor windings, transformer and generator windings, etc., that results from drying out procedures, where these have become necessary because of excessive humidity or because of operation in a moisture laden atmosphere.

## ELECTRICAL SAFETY

The safety of electrical installations and apparatus both to the operator and to the general public depends upon the quality of the insulation in that installation. It is essential therefore, that the insulation be checked when the equipment is first installed, whilst subjected to a voltage high enough to break through any mechanical flaws arising from manufacture or installation.

In order to avoid interruptions and breakdowns, it is also desirable that tests of insulation and of equipment condition are made from time to time after installation, to ensure that deterioration occurring from the accumulation of dirt or damp, or by the mechanical factors of wear or breakage does not render the insulation unsafe.

The BM8/2 is particularly suitable for these tests and for testing 415V 3-phase systems as well as lower voltage circuits.

# PRELIMINARY CHECKS

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## INSERTING BATTERIES

Turn the instrument over and remove the battery cover on the back of the instrument by inserting a coin under the slot and levering off. Fit six batteries (HP7 or equivalent) into the spring clips ensuring that the polarity indicated is followed exactly, and that the insulator is fitted underneath the batteries. Replace the cover.

## BATTERY CONDITION

Battery condition should always be checked before commencing any testing procedure. This will ensure that the instrument is always ready to give an accurate indication. To do this turn the Range selector to 'B' (battery) and press the Test button. The meter pointer should move to the scale mark 'B' or beyond. If the pointer does not move or rests over the black section of the scale mark, replace the batteries immediately. Never leave discharged batteries in the instrument; they may leak electrolyte and cause corrosion damage.

## TEST LEADS

Check that the instrument test leads have:—

- (1) No break in the insulation
- (2) No break in the conductor

The leads are tested as follows:—

- (a) Insert the leads into the tester, Ensure that the outer ends are not in contact. Set the Range selector switch to 1000V. Press the Test button. The pointer should indicate infinity. Failure to do this indicates that the leads may be faulty and should be inspected.
- (b) Connect the test leads together at their crocodile clips. Select the 50V range. Press the test button. The meter should read zero. Failure to do this indicates that the leads may be faulty and should be checked individually for a break.

# OPERATION

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## **WARNING**

The circuit under test must be isolated. Check that the circuit is 'dead' before connecting any apparatus and before making any test.

## **INSULATION RESISTANCE TEST**

- (1) Insert the red test lead into the red socket.  
Insert the black test lead into the black socket.
- (2) Check the battery and the test leads as described.
- (3) Set the Range selector to the required test voltage.
- (4) Connect the red lead to the equipment frame or earth.
- (5) Connect black lead to the circuit under test.
- (6) Press the Test button and read the insulation resistance figure in megohms multiplying or dividing by the appropriate range factor.
- (7) Capacitive circuits must be discharged before disconnecting the test leads. Turn the selector switch to DISCHARGE and release the Test button.  
**WAIT ONE MINUTE BEFORE DISCONNECTION.**



# SPECIFICATION

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<b>Insulation range test voltage d.c.</b>	<b>Resistance at highest scale point</b>	<b>Batteries</b>	Six HP7 cells (1,5V each) or equivalents IEC R6, R6L, 280, 815
50 V	1000 M $\Omega$	Battery Check	Indication on dial when button is pressed with battery test position selected.
100 V	2000 M $\Omega$	Battery drain	200 mA (max)
250 V	5000 M $\Omega$		
500 V	10 000 M $\Omega$		
1000 V	20 000 M $\Omega$		
<b>Short circuit current</b>	0,8 mA approximately	<b>Dimensions</b>	153 x 59 x 95mm (6 x 2 $\frac{5}{16}$ x 3 $\frac{3}{4}$ in)
<b>Range selector</b>	Click-stop rotary switch. Positions, 'B' 50V/DISCHARGE, 100V, 250V, 500V, 1000V	<b>Weight</b>	0,68 kg (1lb 8 oz)
<b>Movement</b>	Taut-band suspension Permanent magnet moving coil		
<b>Accuracy</b>	$\pm 1,27$ mm (0,050 in) from any marked position on the scale		

# ACCESSORIES

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## SUPPLIED WITH INSTRUMENT

Two test leads (red and black)

Two prods and shrouded crocodile clips

Catalogue No. 6320-058/059

Batteries HP7 (or equivalents)

Operating instructions

## AVAILABLE AT EXTRA COST

Carrying Cases

Leather

Catalogue No. 40090

Imitation leather

Catalogue No. 40091

Companion case

Catalogue No. 63355

For two instruments e.g. BM8/2 with LT3/2

Line-Earth Loop tester or Avometer Model 73.

Carries all test leads. Leather covered.

# INSTRUMENT REPAIRS AND SPARE PARTS

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The manufacturer's service and spare parts organisation for MEGGER instruments:—

## **THORN EMI Instruments Limited, Parts and Service Centre,**

Archcliffe Road,  
Dover,  
Kent CT17 9EN,  
England.

Tel: Dover (0304) 202620

Telex: 96283 Avomeg G

## **Approved Repair Companies**

A number of independent instrument repair companies in the U.K. have been approved for repair work on most MEGGER instruments, using genuine MEGGER spare parts. Their names and addresses are listed in the Warranty Booklet, supplied with each new instrument.

## **Overseas**

Instrument owners outside Great Britain should consult the Appointed Distributor/Agent for their country regarding spare parts and repair facilities. The Distributor/Agent will advise on the best course of action to take. Names and addresses of Overseas Distributors/Agents are given in the Warranty Booklet supplied with each new instrument.

If returning an instrument to Britain for repair, it should be sent, freight pre-paid to the Parts and Service Centre at the address shown opposite. A copy of the Invoice and of the Packing Note should be sent simultaneously by airmail to expedite clearance through the U.K. Customs.

A repair estimate showing return freight and other charges will be submitted to the sender, if required, before work on the instrument commences.

**NEW MEGGER INSTRUMENTS ARE  
GUARANTEED FOR 12 MONTHS FROM THE  
DATE OF PURCHASE BY THE USER.**

# COMPONENTS LIST

## Main PCB Assembly

R1	510Ω ± 2%	½W	26836-106
R6, R7	12MΩ ± 20%	½W	26834-669
R8	560kΩ ± 2%	½W	26835-355
R10	11kΩ ± 2%	½W	26836-138
R11, R12	30kΩ ± 2%	½W	26836-148
R13, R15	240kΩ ± 2%	½W	26836-170
R16, R21	75kΩ ± 0,3%	¼W	26835-600
R17	180kΩ ± 0,3%	¼W	26835-517
R18	390kΩ ± 2%	½W	26836-175
R19	1,5kΩ ± 2%	½W	26836-117
R20	12kΩ ± 2%	½W	26836-139
R22	1,3MΩ ± 1%	½W	26835-630
R23	51Ω ± 5%	2½W	26835-632
R14	Select on test		
C5, C6	22nF ± 20%	630V	27889-116
C7, C8			
C9	10nF ± 20%	500V	27536-336
C10	0,1µF ± 20%	630V	27889-566
D4	Zener Diode 5,1V		28863-312
D5, D6	Diode BYX10		28862-884
D7, D8			
TH1	Thermistor VA 1055S		28863-008
RV1	250Ω ± 20%	½W	27889-322
RV2	250kΩ ± 20%	½W	27889-320

RV3	4,7kΩ ± 20%	½W	27889-698
RV4	500kΩ ± 20%	½W	27889-318
RV5	4,7Ω ± 20%	½W	27889-698

## Transformer PCB Assembly

R2	510Ω ± 2%	½W	26836-106
R3, R4	100Ω ± 2%	½W	26836-089
R5	1kΩ ± 2%	½W	26836-113
C1	10µF 25V electrolytic		27888-984
C2, C3	10µF 25V electrolytic		27888-984
C4	47nF ± 20% 250V		27889-273
D1	Zener diode 5,1V		28863-312
D2, D3	Diode 1N4148		28433-801
VT1, VT2, VT3	Transistor 2N2905A		28862-861
	Plug in transformer assembly		6130-889
	+ Transformer assembly (Alternative to above)		
	+ Hex nut		21810-601
	+ Fixing screw		21816-509
	+ The above 3 items required if 6130-889 not available		
	Heatsink		28862-824
	Transistor pad		28588-225

# CIRCUIT DIAGRAM

